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Modeling the impact of magnetic fields in positron emission tomography

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The intrinsic spatial resolution of Positron Emission Tomography (PET) is known to be improved in the presence of strong magnetic fields due to the magnetic field induced curling of positrons. In this study a simple mathematical model has been developed using the fundamental theories of electricity and magnetism that predicts the impact of applied external magnetic field strength on the PET image resolution for different radioisotopes. The proposed model accounts for the energy of the radioisotope, tissue density and range straggling effect. Moreover, the mathematical model can be directly incorporated into any Monte Carlo methods to get more accurate results. In order to validate the proposed model, we have compared our results with the experimental results obtained by Bruce E. Hammer et al. The comparative analysis reveals that the results obtained using the proposed model is consistent with the experimental observations. The proposed model can help understand the effect of magnetic fields in PET imaging accurately, which will be useful to optimize the use of magnetic fields for specific PET imaging studies. Moreover, the results obtained from the model theoretically augment the concept of integration of PET and MR scanners.

Biography

R Vaitheeswaran has completed his MS (Specialized in Medical Physics) from College of Engineering, Anna University, Chennai. He is working in Philips R&D Center (Healthcare division), Bangalore as Medical Physicist. He has published more than 9 papers in reputed journals and has about 10 US patents filed in his name. He has presented more than 25 research papers in national and international conferences. He is a reviewer for few international journals in the field of Medical Physics.

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